CHEST DRAINAGE APPARATUS WITH AMBIENT AIR SEALING

This invention relates generally to catheter apparatus, and more particularly to an improved intrapleural catheter apparatus and combined apparatus for installing the improved intrapleural catheter.

BACKGROUND OF THE INVENTION

Catheter apparatus, particularly useful for the drainage of the chest cavity, i.e. the region surrounding the lungs, in the treatment of certain chest injuries, illnesses and in post-operative treatment, was disclosed in U.S. Pat. No. 3,463,159. The apparatus disclosed in the patent, commonly known as the Heimlich valve, has been a successful improvement over earlier catheters in providing means for continuous drainage of the chest cavity, while eliminating the need for cumbersome drainage apparatus, particularly apparatus requiring water traps, such as those shown in U.S. Pat. Nos. 3,363,626; 3,363,627; 3,559,647 and 3,683,913.

While the Heimlich valve is quite useful, it must be used with additional apparatus to insert a catheter into the boy cavity to be drained, to connect the catheter to the valve and to provide for discharge of fluids removed from the body cavity from the discharge of the valve. It has been necessary to obtain the additional apparatus, usually from several sources, and to assure the sterility of each of the components to be placed in communication with the body cavity or in the area of the patient's body in which the catheter is to be inserted. Moreover, while the use of the Heimlich valve permitted rapid emergency treatment and transportation of patients, the additional apparatus frequently restricted the freedom of movement of the patient.

It is therefore an object of the present invention to provide compact, self-contained means for the drainage of a body cavity.

It is another object of the present invention to provide body cavity drainage apparatus in which a catheter is preassembled to the drainage valve apparatus, and the entire assembly is lightweight and portable.

Still another object of the invention is to provide a self-contained sterile kit which can be readily used for drainage of a body cavity.

These and other objects, features and advantages of the present invention will become apparent from the following description when considered in connection with the accompanying drawings.

SUMMARY OF THE INVENTION

In general, the objects and advantages of the present invention are achieved by apparatus for drainage of a body cavity which includes a housing body generally sealed to the ambient atmosphere except for controlled venting as may be specifically provided, an elongated one-way valve mounted within the housing body, and a catheter supported by the housing body and extending outwardly therefrom. The apparatus thus described is intended to be used with a trocar, as will be hereinafter described. In accordance with the invention, the drainage apparatus and a trocar may be packaged in a sterile package to form a sterile kit for the drainage of a body cavity.

More particularly, the objects and advantages of the present invention are achieved by the following apparatus: A housing body is provided having portions which define an inlet chamber and a discharge chamber. The housing body portion defining the inlet chamber includes mounting means for supporting a catheter, preferably an intrapleural catheter, in sealed arrangement with the chamber. The catheter supported by the mounting means extends outwardly from the inlet chamber and is in fluid communication with the chamber. An inlet port is provided in the housing body portion defining the inlet chamber and is adapted to reversibly receive a trocar and is positioned to enable at least a portion of the trocar to pass through the inlet chamber and the catheter. The inlet port is adapted to seal the inlet chamber from the ambient atmosphere in the absence or presence of the trocar.

The apparatus includes a one-way elongated valve mounted in the housing body which couples in fluid communication the inlet chamber with the discharge chamber, so as to permit the passage of fluid between the chambers only through the valve. The valve can be substantially as described in Heimlich U.S. Pat. No. 3,463,159, and can be formed of a sleeve of substantially resilient fluid-impervious material, for example of latex rubber, or, preferably, of urethane or silicone elastomer. The sleeve has its inlet end held open and in communication with the inlet chamber, while its normally closed outlet end resides in the discharge chamber. The valve is normally held closed along a substantial length of the sleeve by the substantial resilience of the sleeve material, and is adapted to progressively open and close to permit the irreversible passage of drainage material passing therethrough from its inlet end to its outlet end.

In the use of the apparatus of the present invention, a trocar having an external diameter almost as large as the internal diameter of the catheter portion of the apparatus is inserted through the inlet port of the inlet chamber and through the catheter supported by the mounting means in one wall of the inlet chamber. The trocar end supporting the outermost end of the catheter, with the remainder of the apparatus suppported by the trocar, is inserted into the body cavity. Following insertion, the trocar is removed from the catheter, while leaving the end and at least the portion of the catheter adjacent thereto in the body cavity, and withdrawing the trocar from at least a substantial portion of the inlet chamber to provide communication from the catheter to the inlet chamber and the one-way valve. Preferably, the trocar is completely removed from the inlet chamber and the inlet port, and hence the apparatus, so as to avoid accidental reinsertion of the trocar or manipulation of the apparatus by accidental movement of the trocar. Upon removal of the trocar from the inlet port, the inlet port provides a seal to the ambient atmosphere. Fluids and other materials to be drained from the body cavity can now flow through the catheter into the inlet chamber and pass through the one-way elongated valve and into the discharge chamber where it is prevented from reentering the catheter and the body cavity by the presence of the one-way valve.

It can be seen that the apparatus of the present invention is most particularly adapted for insertion into the chest cavity in the area of the lungs, for the purpose of draining air and other fluids, as well as blood clots, particles and the like therefrom.

The apparatus of the present invention can further include on the exterior surface of the housing body portion defining the inlet chamber which includes the mounting means for supporting the catheter, a material which is adapted to adhere to the exterior of the body